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LICHEN NOTES No. 6.

A List of the *Parmelia* Species of British North America, contained in the Herbarium of the Canadian Government at Ottawa, with Descriptions of those Species not Mentioned in Tuckerman's Synopsis, and of Several New Forms.

G. K. MERRILL.

It is thought best to make this list the vehicle for description of a number of *Parmelia* forms not commonly recognized by American students. Differentiated by Nylander for the most part, these unfamiliar names may be said to owe their origin to a refinement of analysis on the part of those proposing them, for groups hitherto viewed as individual.

Tuckerman viewed the genus *Parmelia* through the eyes of Fries, and giving no credence to the value of reagents in dissociating species and varieties, we find in his Synopsis what appears to be an unwarranted neglect of the labors of the European workers for the period just prior to its publication. The so-called "chemical criteria" have received almost universal adoption in Europe, and believing in their value ourselves, we have together with the names cited, recorded the reaction for each. This is done with the purpose of placing in the hands of our students, particularly those of the Northern United States, a working compendium. No other Lichen genus offers more instructive or useful material for the employment of reagents than *Parmelia*, and while contradictory results are sometimes met with, these are no more diverse than are the morphological contrasts for a given species. We unhesitatingly deplore the practice of establishing species on purely chemical grounds, but affirm our belief in the reasonableness of making chemical discrepancies as important as variation in size of spores, presence or absence of isidia, soredia, cilia, etc., in the separation of varieties and forms. Knowledge of American *Parmelia* species in this country is as yet very rudimentary. This is in part due to the very low ebb marking the interest in Lichenology, but principally to the influence of Tuckerman's disposition of the species, and to the fact that the examples in our herbaria are for the most part identified in accordance with his views. But nineteen species of *Parmelia* were described in the Synopsis, while the names of more than a hundred are recorded in various foreign publications as having been collected in North America. The majority of these are entirely unknown to our collectors, although it is safe to say that our larger herbaria contain examples in unsuspected profusion. The time seems at hand to attempt a widening of our acquaintance with *Parmelia*, and to emancipate ourselves from the limits prescribed by Fries.

Some explanation of the symbols, and method of employing the reagents, seems desirable. K is made to stand for a solution of potassic hydrate in water (one in two, by bulk). C a solution of chloride of lime (saturated). If on application of K or C to the surface of a plant a distinct yellow coloration is immediately noted an affirmative sign + is placed after the symbol; if no color is produced a negative —, thus K+ or C— as the case may be. Where the symbol reads as in *P. physodes* K⁺, it means that

the solution produces a coloration on the surface but none on the medulla (me.). Application to the medulla is made by abrading the surface until the tissue just beneath the cortex is exposed, then wetting with a drop of the solution. Me. K (C) refers to the practice of first applying K and following it on the same spot with C. The value of this test depends on an attentive eye, as the reaction is less positive than with K or C alone. The usual coloration produced with K is a distinct yellow, orange-yellow or greenish-yellow. When the color is faint it is indicated by f. following the + sign, and when other colors are developed it is usual to indicate same at length. A tardy response to test is not to be considered at all, except in the case of those plants first showing a yellow, followed after a time with some other color, usually red, as in *P. perforata*. This is symbolized for the species mentioned with $K^+_>$ red, or in the case of *P. subquercifolia* $K^+_>$ red. Solutions should be kept in tightly stoppered dark colored bottles. Apply with a dropper or glass brush.

Parmelia Ach.

SUB-GENUS MENEGAZZIA (MASS.) WAIN.

P. PHYSODES (L.) Ach. Methodus p. 250.

Reaction K^+ , me. K (C) +orange.

On fences, old boards, dead wood, trunks of trees, and rocks.

3652, Montmorency River, Que.; 684, Lake Superior; 685, Cape Breton; 667, Bay du Chaleur; 680, Dent's Lake, B.C.; 3305, Sable Is., N. S.; 674, Belleville, Ont.; 672, Nipigon River, Ont.; 675, Lake Nipigon; 666, Jumping Pound Creek, Alta.; 665, Elbow River, Alta; collected by John Macoun. 662, Lat. 61°, Long. 104°, J. W. Tyrrell; 664, Clearwater Lake, Labrador, A. P. Low, and Vancouver Is., Dawson.

P. PHYSODES f. *PLATYPHYLLA* (Ach.) Merrill.

P. physodes var. *platyphylla* Ach. Methodus, p. 251.

Laciniae broader than in the type, appearing to merge at the centre, the surface rugose and complicate, and the lobes crenate, sometimes sorediate at the apices.

On wood and rocks.

682, Comox, V. I. (typical); 681, Victoria, V. I.; 688, Canaan Forks, N.B., John Macoun. The last two numbers are intermediate states between the present and type, and seem to negative the varietal rank given the form by Acharius

P. PHYSODES f. *LABROSA* (Ach.) Arn. Lich. Exs. No. 297.

P. physodes var. *labrosa* Ach. L. U. p. 493.

Differs from the type in that the laciniae are recurved-ascendent at the apices, and slightly dilated and sorediate on the under surface.

On rocks, fences and trunks of trees.

3497, Algonquin Park, Ont.; 661, Ottawa, Ont.; 676, Brighton, Ont.; 697, Victoria, V. I.; 3656, Cap. à. L'Aigle, Que., John Macoun.

A very distinct form of *P. physodes* when found with the characters well marked, but intermediate states are common. The form seems to attain its greatest perfection on the small branches and twigs of coniferous trees.

P. PHYSODES f. subsidioides Merrill f. nov.

Like depressed conditions of the type, but interruptedly isidio-furfuraceous.

On rocks and old logs.

3635, Laggan, Alta.; 687, Elbow River, Rocky Mts. J. Macoun.

P. PHYSODES var. ENTEROMORPHA (Ach.) Tuck. Syn. Lich. N. E. p. 28.

P. enteromorpha Ach. Methodus, p. 252.

On trees.

695, Hastings, B. C.; 689, Victoria, B. C.; 688, 692, 693, 694, Vancouver Is. J. Macoun.

P. PHYSODES ENTEROMORPHA f. rugosa Merrill f. nov.

Differs from var. *enteromorpha* in being constipate-rugose, somewhat flavescent in color and with the laciniae more or less black-edged as in var. *vittata*.

On decayed wood.

696, McLeod's Lake, B. C. J. Macoun.

Comparable with *P. lugubris* Pers. in Gaudich. Uran. p. 196, which Nylander Syn. p. 401 cites as a form of var. *vittata*. The specimen fruited, the apothecia attaining to 3 cent. in diameter. While specimens of *P. physodes* are often found with wrinkled or rugose thalli, that character is more infrequent in var. *enteromorpha* than in the other forms.

P. PHYSODES var. VITTATA Ach. Methodus p. 252.

On earth.

588, Vancouver Is., J. Macoun, sub-nodulose and intermediate with var. *enteromorpha*; 698, St. Paul's Is., Behring Sea, J. M. Macoun, denigrate and suggests *P. austerodes* Nyl. The specimens of var. *vittata* from the west coast of America contained in our herbarium are for the most part intermediate states uniting the characters of both vars. *enteromorpha* and the present. There seems to be no good reason for making a species of *vittata* notwithstanding asserted minute differences.

P. PHYSODES VITTATA f. HYPOTRYPODES Nyl. in Flora 1875, p. 106.

Differing but little from var. *vittata* except in being more divided with the laciniae less linear. In typical examples the lobes at and sometimes superficially near the apices are provided with conspicuous white dilated soredia.

On rocks, trees and mosses.

669, Lake Nipissing, Ont.; 612 694, St. Anne's des Monts River, Que., J. Macoun; 617, Lake Mistassini N. E. T., J. M. Macoun.

Our examples are without the perforations of the European forms and the apices of the laciniae do not gape as in forma *labrosa* of the type. It is probable that most of the forms identified as var. *vittata* and cited from eastern N. America may be placed here.

P. PERTUSA (Schränk.) Schaer. Lich. Helvet. Spiclg. II. p. 457.

Reaction K^+ , C^- .

On old logs and trees.

683, Hastings, B. C.; 671, Ottawa, Ont., J. Macoun; 679, New Westminster, B. C. Mr. Law.

Subgenus Anzia Nyl.

SECTION EVANZIA (MÜLL. ARG.) HUE.

P. COLPODES Ach. Methodus p. 251.

Reaction K^+ .

702, on trees, Central Ontario Junction, Ont. J. Macoun.

Subgenus Euparmelia Nyl.

SECTION MELAEENOPARMELIA HUE.

P. STYGIA (L.) Ach. Methodus p. 203.

Reaction none.

On rocks.

836 and 192, Lower Arrow Lake, B. C.; 198, Jumping Pound Creek, Alta. J. Macoun.

P. TRISTIS (Web.) Nyl. Enum. Lich. p. 105.

Reaction none.

72, on rocks, summit of Mt. Benson, V. I. J. Macoun.

Cetraria tristis (Web.) Fr. of Tuckerman's Synopsis, is synonymous.

If *P. lanata* be admitted to this genus, it is difficult to reject the present.

P. LANATA Nyl. Syn. p. 406.

Wainio Rev. Lich. in herb. Linn. asserv. states that *Lichen lanatus* L. is *Ephebe pubescens* Ach.

Reaction none.

3010, on earth, summit of Mt. Benson, V. I., growing mixed with *P. tristis*. J. Macoun.

Spores in West American specimens alectoroid and the plant perhaps belongs with *Bryopogon*.

SECTION XANTHOPARMELIA WAIN.

P. CONSPERSA (Ehrh.) Ach. Methodus p. 205.

Reaction K^+_{+} reddish, C^- .

On rocks.

753, Lower Arrow Lake, B. C.; 16, Montmorency River, Que.; 754, Hastings, B. C.; 747, Black Water, B. C.; 761, Victoria, V. I.; 704, St. Anne's des Monts River, Que.; J. Macoun. 757, Nevers Rapids, N. B. Brittain; 758, Peterboro Co., Ont. H. C. Walker.

P. CONSPERSA f. IMBRICATA Mass.

Laciniae short, narrowed and imbricate-complicate.

705, on trees, Carleton, N. B. G. U. Hay.

P. CONSPERSA f. STENOPHYLLA Ach.

P. conspersa var. *stenophylla* Ach. Methodus, p. 206.

Laciniae narrower and more divided than in f. *imbricata*, imbricated and even panniform.

On rocks.

776, Cape Breton Is.; 767, Nipigon River, Ont. J. Macoun.

P. CONSPERSA f. *ISIDIATA* (Anzi) Hue Lich. Ex. n. 702.

The thallus except at the circumference constipate-isidiose, the exciple likewise clothed.

On rocks.

122, Cap à l'Aigle, Que.; 73, Algonquin Park, Ont. J. Macoun.

P. MOLLIUSCULA Ach. Lich. Univ. p. 492.

Reaction me K+ orange.

On earth.

761, Old Wives Creek, Assa.; 760, Bow River Pass, Ry. Mts.; 762, Crows Nest Pass, Ry. Mts. J. Macoun. No. 316 D. N. Am. Li. labelled *P. conspersa stenophylla*, belongs here.

P. CENTRIFUGA Ach. Methodus, p. 206.

Reaction me K—.

On rocks.

3822, Blanc Sablon, Labrador, A. E. Waghorne: 775, Diggs Is., Hudson Straits, R. Bell; 752, Lat. 61°, Long. 104°, J. W. Tyrrell; 773, Clearwater Lake, Labrador, A. P. Low; 774, Tadousac, Can.; 756, Lower Arrow Lake, B. C.; 769, Summit Lake, Que.; 772, Lake Nipigon; 770, Lake Superior, J. Macoun.

Commonly found only infertile but some of the specimens well fruited. Easily distinguishable from *P. conspersa* which it somewhat resembles by its blackish-brown color below, in *P. conspersa* reddish-brown.

P. DIFFUSA (Web.) Th. Fr. Arct. p. 60.

Reaction K—.

On bark of trees and dead wood.

3665, Laggan, Alta.; 3666, Yoho Pass, B. C.; 780, Jumping Pound Creek, Alta.; 777, Lower Arrow Lake, B. C.; 130, Banff, Ry. Mts.; 785, Cape Breton, J. Macoun. No. 4023 on old logs, Montmorency Falls, Que., J. Macoun, is provided with whitish soredia facies. *P. hyperoptam*, synonymous with *P. ambigua* of Tuckerman's Synopsis, but the above is the old name and should be conserved.

P. HYPEROPTA Ach. Synopsis, p. 208.

Reaction K⁺.

On old logs and fences.

3664, Yoho Pass, B. C.; (characteristic) J. Macoun; 786, Cape Breton J. Macoun, strongly resembles *P. diffusa* but is cinereo-glaucescent with whitish soredia; 3820, Labrador, Waghorne.

This is *P. ambigua* var. *albescens* of Tuckerman's Synopsis. The Acharian name seems to have priority over *albescens*, Wallr. It is a curious fact that dealbate conditions of *P. diffusa* are often found growing with that plant, almost impossible of separation. But typical corticoline *P. hyperopta* is in our experience unaccompanied by *P. diffusa*. It will not be improper to use the designation *albescens* for the whitish states of *P. diffusa*.

SECTION HYPOTRACHYNAE WAIN.

GROUP CYCLOCHEILAE Arn.

P. OLIVACEA (L.) Ach. Methodus, p. 213.

Reaction me C—.

On tree trunks and branches of trees.

3636, Laggan, Alta; 3660 and 3661, Montmorency River, Que.; 7117 Nipigon River, Ont.; 707, St. Anne's des Monts River, Que.: 710, Rock-Mountains; 708, Kanaskis, Ry. Mts.: 712, Revelstoke, Ry. Mts.; 719, Jump, ing Pound Creek, Alta.: 716, Victoria, V. I., J. Macoun; 715, Athabasca Rivir. J. M. Macoun; 714, Canaan Forks, N. B., J. Moser.

The plant here listed is that form of the *olivacea* group marked by its distinctly rugulose thallus. This and the lack of medullary reaction will serve to distinguish. Tuckerman appears to have made no effort to discriminate the many forms of affinity with the above established by Nylander, but in large series of specimens that author's differentiations will appear to be well founded and reasonable. It may be noted that passage forms between the various *olivacea* species are seldom met with, and each seems to be fairly constant to its cited characters.

P. GLABRA Schaer. exs. No. 370.

Reaction K^+ , C_+ rose.

Thallus membranaceous, orbicular, loosely attached, bright brown or greenish olivaceous, laciniae more or less transversely rugulose, commonly rounded at the apices or slightly crenulate, smooth and even shining; below concolorous or blackish and slightly rhizinose. Apothecia concave or plane, concolorous, the exciple slightly crenulate and usually papillate. Spores $\frac{11-18}{7-8} \mu$. Not previously listed from America.

718, on trunks, Ottawa, J. Macoun.

P. CONSPURCATA (Schaer.) Wain. Notulae de syn. lichenum in Medd. of Soc. pro. Faun. et Fl. fennica, Feb. 1886.

P. olivacea a. *corticola* b. *conspurcata* Schaer. exs. no. 371.

Reaction K^- , C_+ rose, faint.

Thallus membranaceous, orbicular, appressed but not closely attached, olivaceous-brown and opaque, laciniae more or less confusedly rugulose, the tips of the lobes rounded and crenate with the upper surface whitish or yellowish punctate-sorediate, these dispersed over the thallus centrally, but particularly following the edges of the laciniae; below blackish and rhizinose, concolorous at the circumference and glabrous. Apothecia not seen in American specimens, and no specific description of same is available from foreign sources.

On alders.

732, Cape Breton; 717, Hastings, B. C.; 44, Blackwater River, B. C.; J. Macoun.

A not uncommon American plant, but only recognized in published lists from material determined by Wainio; collected by Dr. Fink in Minnesota.

P. VERRUCULIFERA Nyl. in Flora, 1878.

Reaction K^- , C_+ rose, me. $K(C) +$ rose.

Thallus much as in the last, but the surface at the centre confluent verrucose-granulate or sub-isidiose, the granulations here and there white-tipped. Apothecia not known in American specimens.

On old fences, boards and hemlock bark.

720, Seymour, W. Ont.; 3306, Sable Is., N. S.; 3502, Algonquin Lake, Ont. J. Macoun.

Very near to *P. conspurcata* but distinguishable by the surface and reactions. Reported from Isle Miquelon and collected in Maine by the writer, with probably a wider distribution.

P. FULIGINOSA Nyl. in Flora, 1868.

Reaction K^- , C^- , me. $K(C) + \text{red}$.

Thallus membranaceous, orbicular, appressed, brownish-olivaceous or darker, furfuraceous, fuliginose or black-isidiose; beneath blackish and sparingly rhizinose; lobes plane, crenate; apothecia moderate, brownish, the exciple thickened and slightly crenate. Spores $\frac{9-12}{5-6} \mu$.

P. FULIGINOSA f. *LAETEVIRENS* Krbg.

Color of the thallus much lighter than the type, a medium green, the isidia concolorous.

Only the form so far seen.

On alders and fence rails.

721, Hull, Que.; 723, Ottawa, Ont., J. Macoun.

Similar to certain forms of *P. olivacea*, but kept apart by the reaction and isidia. Not previously listed from America, although the species cited from Labrador and Isle Miquelon.

P. PROLIXA (Ach.) Nyl. Syn. p. 396.

Reaction none.

On rocks.

3501, Labrador, Waghorne. 725, Lake Nipigon, Ont. J. Macoun. This is *P. olivacea* var. b. *prolixa* of Tuckerman's Synopsis.

P. PROLIXA f. *PANNIFORMIS* Nyl. Syn. p. 397. See Tuck. l. c.

729, on rocks, Victoria, V. I. J. Macoun.

P. SOREDIATA (Ach.) Nyl. in Flora, 1879.

Reaction none.

On rocks.

728, Galt, Ont.; 3446, Algonquin Park, Ont.; 729, Black Water River, B. C.; 730, Nipigon River, Ont. J. Macoun.

P. olivacea var. c. *sorediate* of Tuckerman's Synopsis.

P. DUBIA (Wulf.) Schaer. Enumer. p. 5.

Lichen dubius, Wulf. in Jacq. collect. IV. p. 275, tab. XIX. fig. 1.

The antique name for *P. Borreri* Ach. No specimen of this species was found in the herbarium, a rather remarkable fact, and one confirming the specific rank of *P. rudecta*.

P. RUDECTA Ach. Synopsis p. 197.

Reaction K^+ , me. $C+$ red, soredia $C+$ red.

On trunks and old rails.

3631, Peele Point, Ont.; 3654, Montmorency River, Que.; 904, Brighton, Ont., J. Macoun; 605, Edmonton, Ont. J. White.

P. Borreri var. *rudecta* of Tuckerman's Synopsis. This plant deserves specific rank equally with such isidiose forms as *P. crinita*, *P. pilosella*, *P. sulphurata* etc. The writer has yet to examine transitional states between the present and *P. dubia*, if such exist.

P. frondifera Merrill sp. nov.

Reaction K^+ , me. C—

Thallus cartilagineous, orbicular, somewhat expanded, decumbent, testaceous at the circumference but cinereo-glaucous centrally, lobate-lacinate and profoundly divided, but confusedly plicate and sub-imbricate centrally, margins crenulate or broadly crenate at periphery, but centrally more divided and even fimbriate and here together with the surface of the thallus beset more or less with reduced fimbriate lobules; the upper surface opaque, confusedly rugulose, and here and there ruptured forming verrucae, these white-soresdiate-punctate; within white; below black and rhizinose at the centre, pale with concolorous rhizinae at the circumference. Apothecia short pedicellate, cup-shaped, rather large, the disk light-chestnut and bordered by an incurved, radiately rugose and sometimes fissured exciple, this similarly punctate-soresdiate with the thallus. Spores oblong-ellipsoid $\frac{7.1}{6.7} \mu$.

On cedar bark, No. 3627, Peele Point, Ont. J. Macoun.

Very near *P. dubia* and *P. rudecta* but separated by lack of reaction with C, the lobulate upper surface and its smaller spores.

Comparable with *P. reddenda* Stirton in lack of reaction. The curious fact may here be noted that nearly all lichenists at some time examine specimens of *P. dubia* and *P. rudecta* which fail to afford its characteristic reaction with C. Nylander himself had this experience, but offered no explanation. All specimens of the two species in our own herbarium with one exception respond to the reagent, and that is a normal *P. rudecta*. Three specimens of *P. frondifera* from widely separated localities, Ontario, New York and Florida are me. C—, and it seems not to be an accidental negative.

P. ULOPHYLLA (Ach.) Merrill.

P. caperata var. *ulophylla* Ach. Lich. Univ. p. 458.

Reaction K^- , C_+ bright rose, me. $K(C)^+$ rose, but evanescent; soredia tinged red by C.

Thallus cartilagineous, broadly expanded, decumbent, orbicular, ochroleucous or greenish-ochroleucous, lobate-lacinate at the circumference, but the laciniae coalescing centrally, the margins cut-crenate at the periphery, but sinuous, elevated and invested with conspicuous sub-globose or limbate, granulate or sometimes farinose soredia at the centre, these here and there running together and forming a crust; above opaque, or shining at the circumference, confusedly rugulose, the cortex sometimes here and there rimose or punctate-ruptured producing white soredia; within white; below black and opaque at the centre, shining and brownish at the periphery, with few and scattered rhizinae. Apothecia short-pedicellate, moderate, the disk chestnut, bordered by an incurved, slightly crenate exteriorly soresdiate exciple. Spores ellipsoid, $\frac{16.8-7}{7-9} \mu$.

On trunks, No. 734, Manitoba House, Man. J. Macoun.

This plant has been variously called *P. caperata* var. *ulophylla* Ach. Lich. Univ. p. 458. *P. rudecta* var. *ulophylla* Ach. Synopsis p. 197. and *P. Borreri* var. *ulophylla* Nyl. and Hue. It is probable that this is the plant

mentioned by Tuckerman in the paper, Am. Naturalist Apr. 1868, entitled "Can Lichens be identified by Chemical Tests?" He says "*P. caperata* is reckoned, . . . among the species the medullary layer of which gives no indication of a red tinge with the reagent. I find yet the contrary the case in North American specimens, as well from Arctic American as Texas, etc., almost all these states being marked by elevated powdery margins, . . . as if a var. *ulophylla* (see Ach.) filled in this species an analogous place to the var. *olivetorum* (*P. olivaria*) in *P. perlata*." Tuckerman adds that some specimens of *P. caperata* have a normal reaction however. The form as examined is distinct and deserves specific rank.

P. TILIACEA Ach. Methodus p. 215.

Reaction K^+ , me. C+ red.

P. TILIACEA var. *VICINIOR* (Hue) Merrill *P. vicinior* Hue. Li. Ex. Eu. I p. 156.

K^+ , C-, K(C)-

Distinguished from the species and var. *subquercifolia* by difference in reaction, and so far as American examples furnish evidence there is nothing else to satisfactorily differentiate with. The writer possesses three examples of *P. tiliacea*, identical in lobation, and thecial characters, in fact exactly similar to the eye and with microscope, but of which one affords the reaction of *P. tiliacea*, another that of *P. vicinior*, and the last that of *P. subquercifolia* $K^+_{>}$ at length red. Both Tuckerman and Willey have touched on the perplexities attending the use of reagents with *P. tiliacea*, but the present disposition satisfactorily meets all requirements of classification for the *P. tiliacea* forms from Northern America. *P. tiliacea* v. *sublaevigata* Nyl. of Tuckerman's Synopsis is made synonymous with *P. subquercifolia* by Hue.

On trunks,

3634, Stittsville. Ont.; 3651, Montmorency Falls, Que.; 597, Brighton, Ont.; 991, Cape Breton; 3509, Algonquin Pk., Ont.; 593 and 592, Ottawa, Ont.; 595, St. Anne's des Monts River, Que.; 594, Quebec, J. Macoun. 596, Canaan Forks, N. B. J. Moser.

No. 102 D. N. A. Li. belongs here.

GROUP IRREGULARES WAIN.

P. SAXATILIS (L.) Ach. Methodus, p. 204.

Reaction $K^+_{>}$ crimson.

On rocks, trees, old planks, logs, fences and on the earth.

3647 and 3648, Cap à L'Aigle, Que.; 609, Truro, N. S.; 611, Nipigon River, Ont.; 3512, Algonquin Pk., Ont.; 621, Burrard Inlet, B. C.; 614, Lake Nipissing; 622, Red River, Man.; 620, Victoria, V. I.; 629, Comox, V. I.; 625, Stittsville, Ont.; 634, Jupiter River, Anticosti; 616, Lower Arrow Lake, B. C.; 643, Jumping Pqund Creek, Ry. Mts.; 640, Victoria, B. C.; 636, Nipigon Lake, Ont.; 638, Cape Breton; 3493, Algonquin Pk., Ont.; 641, Brighton, Ont.; J. Macoun. 647, Clearwater Lake, Labrador, A. P. Low; 625, 627, St. George's Is., Bering Sea; 630, 618, 592, St. Paul's Is., Bering Sea, J. M. Macoun. 623, Vancouver Is. Dawson.

P. SAXATILIS f. *FURFURACEA* (Schaer.) Lich. Helvet. Spiclg. p. 455.

Differs from the species in being more or less isidioid. In high northern latitudes the isidia sometimes cover and completely conceal the thallus with a thick crust, except at the circumference.

On rocks usually, but occurring on trees.

656, Lower Arrow Lake, B. C.; 633, Gaspé, Que.; 659, Cape Breton, J. Macoun. 635, St. Paul's Is., Bering Sea; 624, St. George's Is., Bering Sea, J. M. Macoun. 3492, Blanc Sablon, Labrador; 3823, Bolster Rock, Labrador, A. C. Waghorne.

P. SAXATILIS var. *OMPHALODES* (L.) Fr. Li. Eu. Ref. p. 62. f. *CAESIO-PRUINOSA* Nyl. by Stiz. St. Gall. Nat. Ges. 1876, p. 206. 602, Cape Vancouver, Bering Sea. J. M. Macoun.

No *omphalodes* proper found in the herbarium. The form is like the species in all except being pruinose throughout. It has been the habit of American lichen students to call any dark, reddish, brownish or blackening *saxatilis*, *omphalodes*, but the genuine form is shining and smooth, not opaque. The reddish or dark color of *omphalodes* or *pseudo-omphalodes* is due to a natural maceration with meteoric or other waters.

P. SAXATILIS *OMPHALODES* f. *PANNIFORMIS* (Ach.) Nyl. by Stiz. l. c.

Thallus densely imbricated, the lobes reduced and scale-like and sometimes caesio-pruinose as in the last.

On rocks

654, Lower Arrow Lake, B.C.; 650, Elbow River, Alta.; 648, Lake Nipigon, Ont. J. Macoun.

Panniform conditions of the species are sometimes seen with normal coloration, and it is probable that most of our dark colored *panniformis* is merely the product of discoloration.

P. SAXATILIS var. *LAEVIS* Nyl. Syn. I. p. 386.

Thallus smooth, rather shining, faintly and delicately reticulated, laciniae narrowed, discrete, below clothed densely with black rhizinae. Apothecia moderate, for the most part plane, chestnut colored with an entire margin.

On trunks.

639, Cape Breton; 619, Mt. Benson, V. I.; 607, St. Anne's des Monts River, Que.; 608, Jupiter River, Anticosti; J. Macoun; 606, Tobique, N. B. G. U. Hay.

P. SULCATA Tayl. in Mack. Flor. Hibern. (1836) p. 145.

Synonymous with *P. saxatilis* var. *sulcata* of Tuckerman's Synopsis.

Reaction as in *P. saxatilis*.

On old boards, posts and rails, trunks and also rocks.

3304, Sable Is., N. S.; 613, Belleville, Ont.; 632, Comox, V. I.; 649, Jumping Pound Creek, Alta.; 645, Lower Arrow Lake, B.C.; 646, Hastings, B. C.; 3655, Montmorency River, Que.; 3647, Cap à L'Aigle, Que.; J. Macoun. Middleton Is., Alaska. J. M. Macoun.

Differing sufficiently from *P. saxatilis* to be accorded specific rank, in the opinion of Nylander and others, the best argument for separation seems to be that there are no connecting or intermediate states between the two.

SECTION AMPHIGYMNIAE WAIN.

GROUP SUBFLAVESCENTES WAIN.

P. CAPERATA (L.) Ach, Methodus p. 216.

Reaction K_+^- or faint+ me. $K(C)+$ reddish or orange.

On trunks, old rails and dead wood.

3491, Algonquin Park, Ont.; 733, Guelph, Ont.; 3663, Lincoln Co., Ont.; 4089, Montmorency River, Que.; 745, Nipigon River, Ont.; 742, 735, Belleville, Ont.; 736, Rocky Mts., J. Macoun; 743, Tobique River, N. B., G. U. Hay; 744, Canaan Forks, N. B., J. Moser; Edmonton, Ont., J. White.

P. caperata, or strictly speaking the plant here catalogued has been ascribed to Dillenius (*Lichenoides caperatum* rosacae expansum, sulphureo virens), by Mudd; to Linnaeus (*Lichen caperatus*) Sp. Plant (1753), p. 1147, almost universally; and to Hoffman (*Lichen caperatus*) Enum. Lich. (1784) p. 94, by Hue Li. Ex. Eur. I, p. 180. Hue seems to base his opinion on the curious discovery made by Wainio and recorded in Rev. Lich. in herb. Linn. asserv. p. 5, that *Lichen caperatus* is the name given by the great botanist in herb. to what is called by Tuckerman *Cetraria juniperina* var. *Pinastris*. This is the more surprising as Linnaeus cites the plant of Dillenius as synonymous with his own, and by no token of the Dillenian plate or text is it to be inferred that they figure or describe *Lichen Pinastris*. This must as surely have been perceived by Linnaeus, as by those later students who have given us commentaries on the Historia Muscorum. That the Dillenian plate really illustrates *P. caperata* is confirmed by Crombie, and notwithstanding the testimony of his herbarium, we believe that Linnaeus framed his diagnosis for *Linchen caperatus* and not *L. pinastris*.

GROUP SUBGLAUCESCENTES WAIN.

P. OLIVARIA (Ach.) Hue Li. Ex. Eur. p. 195.

P. perlata var. *olivaria* Ach, Methodus p. 217.

P. perlata var. *olivetorum* of many authors.

Reaction K_+^+ , me. C+ red, evanescent.

Thallus cartilaginous, expanded, orbicular, loosely appressed, greenish or cinereo-olivaceous, lobed, the margins of the laciniae undulate, crisped, incurved, and centrally more or less ascendant, marginally white limbate-sorediate in typical states; above opaque or somewhat shining and here and there white-punctate; within white; below blackish and paler at the margins, rhizoides few and scattered, Apothecia moderate to large, in the latter state the margin ruptured but otherwise entire; spores oblong-ellipsoid $\frac{14-18}{7-12} \mu$.

On trunks, rocks and old rails.

590, Cape Breton; 1539, Guelph, Ont.; 513, Tobique, N. B.; 18, Montmorency River, Que.; 4, Algonquin Park, Ont.; 563, McKay's Woods, Ottawa, Ont.; 577, Seymour, W. Ont.; 570, Chelsea, Ont.; 569, Belleville, Ont. J. Macoun. 577, Canaan Forks, N. B., J. Moser; 3629, Kingston Mills, Ont. J. M. Macoun.

P. perlata in part of Tuckerman's Synopsis. Tuckerman's conception of *P. perlata* included a very varied assortment of forms. This assemblage has been differentiated by Nylander, Müller and Hue until it may be safely said to comprise a dozen names.

P. olivaria is very distinct from *P. perlata*, although the difference between it and *P. cetrarioides* or the *P. perlata* of some of the European writers is not very obvious. All the American material in our herbarium identified by others as *P. perlata* belongs here, including No. 8, D. N. A. Lich. The nearest approach to *P. perlata* in the Dominion herb. is no. 567, on old logs, Belleville, Ont. J. Macoun. The plant is sterile, but in reaction and most other particulars is in agreement with that species.

P. OLIVARIA f. *CETRARIOIDES* (Del.) Merrill.

P. cetrarioides (Del.) Nyl. in *Flora* (1869) p. 290.

Reaction K^+ orange, me. $K(C)+$ reddish.

With difficulty separable from the preceding on any aspect except its behavior with reagents, and no better definition is practicable. This assertion applies to those conditions of the plant commonly met with. In large series of examples forms of considerable diverseness from typical *P. olivaria* may be found, but such authentic foreign material as has been examined leaves us with the conviction that the extremes of variation should not be made to furnish factors for diagnosis. Students are warned not to accept in a plant under examination furnishing a similar reaction, such as evidence of affinity with the present for there are several *Parmelia* forms belonging with other sections affording the same reaction. On trees.

3626, Leamington, Essex Co., Ont.; 572, Truro, N. S. J. Macoun.

P. PROBOSCEA Tayl. in Mack., *Fl. Hibern.* II. (1836) p. 143.

Reaction K^+ , C^- , me. $K(C)+$ faint red.

Thallus cartilaginous, loosely appressed, orbicular, whitish or pale-glaucescent, irregularly divided, the lobes convex or plane, subimbricate, at the periphery unequally rounded or sometimes angulate-crenate, the margins of the lobes throughout more or less recurved-ascending, ciliate, above smooth and uniform, esorediate and destitute of isidia; within white, below black, at the circumference brownish, or yellowish or sometimes whitish, and glabrous, centrally more or less rhizinose. Apothecia large, cupshaped, sessile or at length sub-pedicellate, imperforate, disk chestnut or lighter, with an entire or subcrenulate margin, the exterior of the exciple faintly reticulate-rugose. Spores ellipsoid $\frac{14-22}{9-12} \mu$. On trees.

584, British Columbia. J. Macoun.

P. CRINITA Ach. forma *PILOSELLA* (Hue) Merrill.

P. pilosella Hue *Causerie sur les Parm.* p. 22.

Reaction K^+ orange, C^- $K(C)-$

Thallus commonly membranous but sometimes thickened, greenish or ashy-glaucous, irregularly divided, often profoundly lobate, the laciniae convex at the centre, more or less plane at the circumference, centrally coalescent, at the periphery entire and rounded, or lacinulate, the margins crenate or lacerate-crenulate and ciliate; above opaque, more or less rugulose, invested centrally with isidia interspersed with short black cilia, the tips of the isidioid excrescences sorediate or not; within white, below black, opaque or at the margins narrowly testaceous and shining, interruptedly short-rhizinose. Apothecia rather large, pedicellate, cup-shaped, without perforation, chestnut or lighter, the margin faintly crenulate. Spores ellipsoid $\frac{22-60}{15-17} \mu$. On trunks.

536, Central Ontario Junction, Ont.; 3633, Southampton, Ont.; 588, Brighton, Ont.; 3628, Bruce Peninsula, Ont. J. Macoun.

P. crinita of Tuckerman's Synopsis appears to include a number of forms by others considered as distinct. There is scarcely anything to distinguish the present from *P. crinita* except the black fibrils of the upper surface, the color of the thallus, and habit of growth. What Tuckerman has termed the southern *P. crinita* seems to be the plant of Acharius.

P. CRINITA forma *varians* Merrill f. nov.

Reaction K^+ orange, C^- , me. $K(C)+$ intense red.

Scarcely differing from the species except in color and reaction, and without the superficial garniture of cilia as in f. *pilosella*.

3828, Carleton Place, Ont. J. Macoun.

The specimen marked *P. crinita* issued with Dr. Fink's Iowa Lichens belongs here. Rockland, Maine.